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FRONT COVER: *Study of a Collie, by P. Sandilands (Paints Division)*

OUR CONTRIBUTORS

Hugh Dunt *is Shipping Manager at Mombasa in Kenya of the Magadi Soda Co. Ltd. He joined this company at the end of 1951 after seventeen years with I.C.I. "I write for fun," he tells us, "but collect more rejections than acceptances." Several of his stories have been printed by "Blackwood's Magazine."*

Scott Forsyth *is Technical Service and Development Manager with Heavy Organic Chemicals Division—one of the key jobs of this new Division and a job which takes him abroad quite often. He is a chemist who joined I.C.I. in 1941 from St. Andrews and Oxford Universities, and spent four years with Alkali Division before being seconded to I.C.I. (New York) Ltd. 1955–58.*

Erik Jorpes *is professor of biochemistry at the Karolinska Institute in Stockholm. He was recently visiting lecturer at the Department of Pharmacology and Therapeutics at the University of St. Andrews. His address on Alfred Nobel was reported in full by the* British Medical Journal.

Alfred and Immanuel Nobel

A Story of Genius and Adversity

By Erik Jorpes

The fortunes of I.C.I. are founded on the genius of Alfred Nobel. Treading in his father's footsteps, Alfred carried on the dangerous work of experiment with high explosives. Thanks to his discoveries, railways achieved such feats as the penetration of the Alps and the Rockies; and mining became both safer and more effective. But success was not achieved without immense struggle, and the story of its ups and downs is one of the most fascinating tales of the last century.

This article is taken from the recent inaugural address delivered by Dr. Jorpes to the post-graduate medical school of the University of St. Andrews.

"If I had not got my work here," said Alfred Nobel, "Ardeer would certainly be the most depressing place in the world. Picture to yourself everlasting dunes with no buildings. Only the rabbits find a little nourishment here; they eat a substance which quite unjustifiably goes by the name of grass, and of which some few traces are to be found here and there. This is a wonderful sand desert, where the wind always blows, and often howls, filling the ears with sand which also drifts about the room like a fine drizzle. There lies the factory, and most of the buildings have hidden themselves behind sandhills. A few yards away the ocean begins, and between us and America there is nothing but water."

The factory at Ardeer can be taken as a symbol for Alfred Nobel's creations. It, like his other enterprises, became very successful with time, but in the beginning the same hard wind as in Ardeer was blowing against the young man, sometimes with a terrible strength. There was in fact no wealth to begin with, not even a name.

The name Nobel is not derived from the Latin word *nobilis*, but from a place named Nöbbelöv, in the South Swedish province of Scania. The family, though introduced into influential circles and endowed with good hereditary genes, never became prosperous. At the time when Alfred Nobel was born his father went bankrupt.

Nobel's father, Immanuel Nobel junior, was an inventor of genius with a quite unusual vitality. Between 14 and 17 years of age he sailed as a cabin boy in the Mediterranean with a ship from his home town, Gäfle—an extremely hard experience for the young boy. The captain and half the crew died at sea. After receiving an incomplete technological education in Stockholm he established himself as a building constructor, contractor and inventor. Very soon, however, he started building beyond his means and also had a large part of his work destroyed by fire. In 1833 he went bankrupt. In order to avoid imprisonment and the insistent demands of his creditors, he moved in 1837 to Finland, then under Russian rule, and soon to Russia, where he established himself as a mechanical engineer in St. Petersburg. His wife joined him there five years later together with their two youngest sons, Ludwig aged 11 and Alfred aged 9.

In his workshop in St. Petersburg Immanuel Nobel made wagon wheels, steam hammers and other tools, but his chief interests soon became explosive mines, based on his own invention, using chlorate and sulphuric acid as a detonator.

After Schönbein's discovery of nitrocellulose in 1846 the mines were mostly iron shells filled with this material. Immanuel's mines apparently were square boxes filled with powder, with long iron poles sticking out from their sides. These poles, when hit by a ship, broke a glass tube with sulphuric acid inside chlorate, sulphur, and sugar, causing a small explosion which lit a fuse, and this in turn set off the powder. It was this idea, of causing a big explosion by means of a little one, that was to be decisive in Alfred Nobel's life.

When the Crimean War was imminent the Russian Government supplied Nobel with a subsidy for the extension of his factory, and when the war broke out in 1854 the Russian High Command entrusted the minelaying programme to Nobel. Kronstadt, the fortress Sveaborg in Finland, and the harbour of Reval in Estonia were protected with mines.

A New Naval Mine

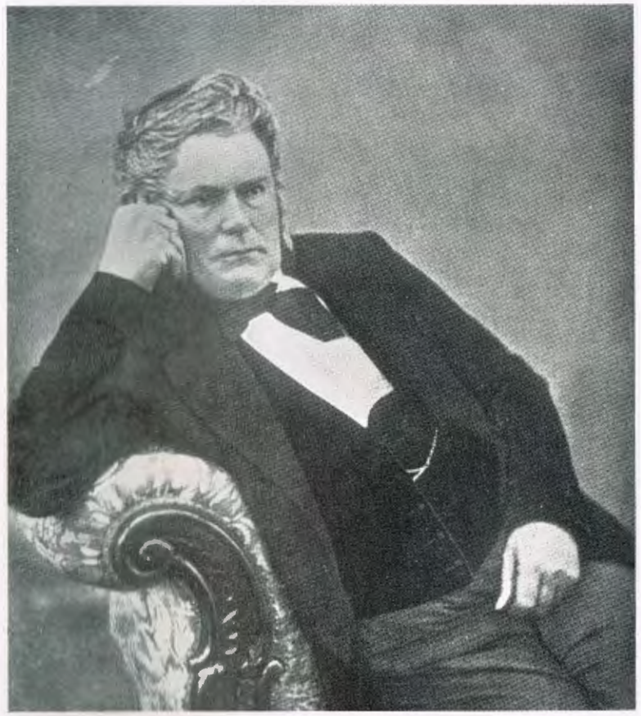
Nobel's submarine mines aroused great interest. On the second expedition of the combined Anglo-French fleet to the Baltic in 1855 the British flagship, the steamer *Duke of Wellington*, captured one of the mines. It exploded on deck and killed one man. The Britons had also seen a Russian steamer being badly damaged when running upon a mine. Rumours of the mines and the knowledge of the strong Russian defence forces on shore then prevented the British fleet from sailing into the innermost parts of the Gulf of Finland. Nobel's mines thus contributed to protect Kronstadt from a bombardment of the kind the fleet on their first expedition in June 1854 had applied so successfully in destroying the Russian fortress at Bomarsund on the Åland islands in the Baltic.

Immanuel Nobel had thus rendered the Russian Government very great services, and, although a foreigner, he was awarded an Imperial gold medal.

Immanuel's Bankruptcy

But Russia is Russia. The Crimean War ended with defeat. The old Tsar Nicolaus I had passed away. The new government disregarded the promises made by its predecessor and placed no orders of any kind in Nobel's enterprises, but, to the contrary, supported his competitors. As a consequence Nobel's workshop went bankrupt. This was in 1859. It was a terrible blow for Immanuel Nobel. Broken down and disappointed, he returned in the same year to Stockholm.

Immanuel Nobel was a genius. Only a genius can without any education in chemistry and with only a few years' technical training construct explosive mines and build steam engines on a large scale in a foreign



Immanuel Nobel, *father of Alfred, in* 1853. *Immanuel invented a type of naval mine which was of great service to the Russian navy.*

country. In his later years, broken by bankruptcy and struck with hemiplegia, he still made suggestions for new inventions. Famous is his prediction of the possibilities of the present-day plywood industry. His predictions have all been amply fulfilled, except in one respect. He suggested that coffins should be so built that one who only seemed dead could himself raise the lid, which should be supplied with air holes for breathing and a cord attached to a bell.

Alfred Nobel was born in 1833, at the time of his father's first bankruptcy. His only formal education consisted of three terms at the elementary school of Jacob's parish in Stockholm at the age of 8 and some instruction in Russia by a private teacher. The education ended when Alfred was 16. He then had an opportunity of visiting the United States for a short period and of travelling in Europe for a couple of years, partly in order to improve his health.

Through his father, Alfred had been introduced into the field of explosives, and he found many important problems awaiting solution. One of them was the employment of nitroglycerin as an explosive.

Owing to the high risk of explosion, this new compound, invented by an Italian in 1847, was very difficult to handle. On the one hand it burned like an oil without explosion when directly ignited, and on the other could explode at any time during storage or if handled carelessly, particularly if the product was deficiently purified and still contained nitric and nitrous acids. Thus nitroglycerin remained a taboo for technicians for eighteen years after its invention. Alfred Nobel succeeded in getting the fluid to detonate at will and to exploit its power.

During the Crimean War a Russian chemist, Zinin, had called the attention of Immanuel Nobel and his son to the possibility of using nitroglycerin in his mines. No practical results came out of the discussion. After his return to Sweden Immanuel tried in 1863 to mix ordinary gunpowder with 10% nitroglycerin, but no real improvement was achieved. Alfred was more successful.

In Russia he had in 1862 placed nitroglycerin in a firmly stoppered glass tube inside a metal tube filled with black powder and ignited the latter by means of a fuse. The whole was thrown into a canal and caused a heavy underwater explosion.

In 1863 he went to Stockholm to join his father in the work with nitroglycerin. Here Alfred repeated his experiments from Russia, but put the components in reverse order. Instead of putting a tube of nitroglycerin into a larger tube filled with gunpowder he dipped a small tube of gunpowder, with a fuse attached to it, into a large tube of nitroglycerin. This gave excellent results. On igniting the blackpowder by means of the fuse, the nitroglycerin exploded, developing its full blasting power.

Nobel's "Patent Detonator" was discovered—Alfred Nobel's greatest invention, which revolutionised the whole technique of explosives and was the most important contribution to the subsequent development of the high explosive industry.

The detonator itself was a very simple piece, a small wooden cylinder about 2 in. (5 cm.) long containing a tightly sealed charge of ordinary gunpowder and with a fuse attached to it. New and more efficient detonators like fulminate of mercury were later found, but the principle remained the same. This is considered

Alfred Nobel *aged* 50. *He was the inventor of dynamite and accumulated a vast fortune, which today provides funds for the famous Nobel Prizes.*

to be the greatest invention of its kind after the invention of blackpowder.

The interest in the new blasting technique was tremendous. The State Railways and different mining companies soon realised the possibilities presented by Nobel's patented blasting oil, and began using it immediately. During the following years Alfred Nobel was occupied by acquiring patents in different countries and setting up factories, by no means an easy task.

Manufacture of the explosive was not free from risk. The first serious accident occurred in Sweden in 1864, when Nobel's Heleneborg laboratory in Stockholm blew up on 3rd September. On this occasion Alfred's youngest brother, Emil, was killed.

A Hamburg paper of 4th December 1865 contained a comprehensive description of another such explosion which happened in New York. In an hotel in Greenwich Street a German traveller had left a demijohn, carefully wrapped in a box, containing 10 lb. of nitroglycerin, which he said he would fetch later. The box was left with the porter and was used alternatively as a seat and as a foot-rest in boot-polishing. One Sunday morning a waiter noticed that red fumes were

The directors of the British dynamite factory *on a visit to Ardeer Factory—where Nobel Division still makes explosives—three years after the factory's opening in* 1873.

issuing from it. The porter carried it out into the street and returned to the hotel. The next moment there was a terrible explosion, destroying the fronts of the neighbouring houses, breaking windows and doors, and tearing up the street to a depth of 4 ft.

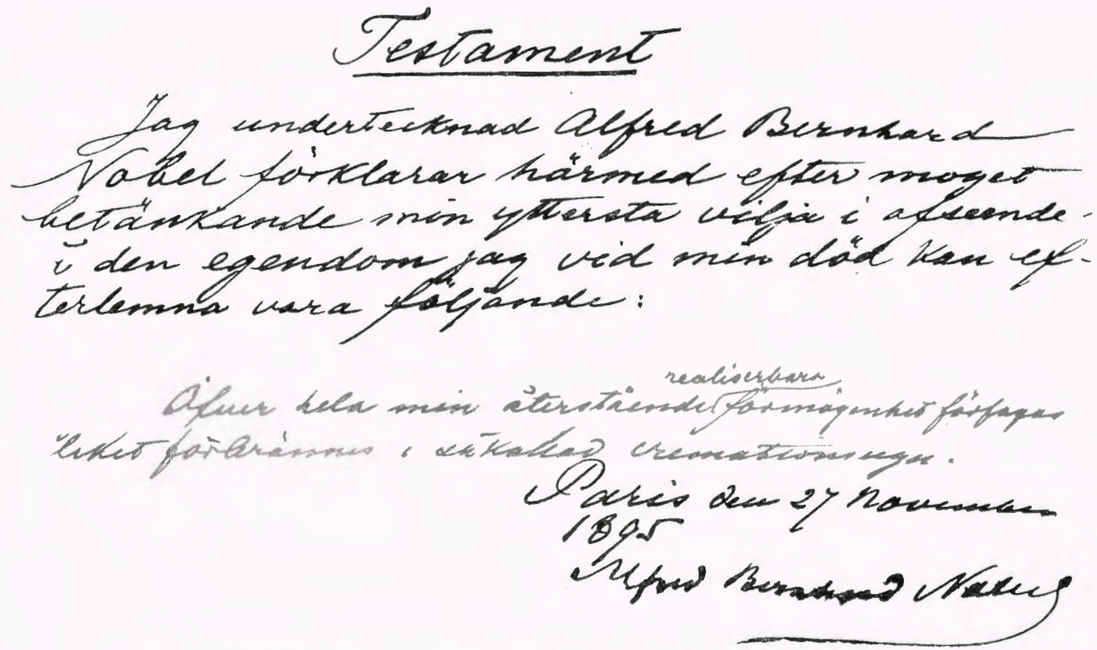
On 3rd April 1866 a serious explosion occurred in Aspinwall, on Panama's Atlantic coast, in which the steamer *European*, which carried a consignment of nitroglycerin for further despatch across the Isthmus of Panama, was completely destroyed with a loss of 47 lives and great material damage. Shortly afterwards, in April 1866, a new explosion occurred in a consignment of nitroglycerin which had been shipped on the same route and had reached San Francisco; 15 lives were lost. Yet another nitroglycerin explosion occurred in Sydney, in Australia, at the same time. Even one of Nobel's earliest factories in Krümmel, outside Hamburg, was destroyed by an explosion in the beginning of May 1866 while he was in America trying to convince people about the harmlessness of his blasting oil and to acquire patent rights on the product.

In America Senator Chandler of Michigan introduced a Bill to "regulate the transportation of nitroglycerin, or glonoin oil," providing that any death caused directly or indirectly by the transportation of this oil on any vessel or vehicle should constitute murder in the first degree and be punished with death by hanging.

These terrible accidents almost threatened to nullify the first great discovery in the explosive field. They must have caused Alfred Nobel serious disquiet. His brother Robert gave him the following advice: "My good Alfred," he wrote, "give up inventing as soon as possible. It only brings disappointment. You have such exceptional qualities that you should turn your attention to more serious matters." The authorities of the city of Stockholm declared after the Heleneborg explosion that if Alfred Nobel wanted to go on with the manufacture he could do it on a barge in the Lake of Mälaren, and do it by himself. And this was what Alfred Nobel did.

The "blasting oil" had become indispensable in railway construction and in the mining industry. They had to have it in spite of the risk.

In the meantime Alfred Nobel experimented intensively in order to make nitroglycerin less dangerous. His efforts finally led to the discovery of dynamite, blasting oil adsorbed by kieselguhr. The diatomaceous earth, a readily available raw material, took up three times its weight of nitroglycerin. The nitroglycerin was thereby stabilised but still explosive on detonation. The dynamite could be safely handled, packed in cartridge form, transported, and stored



Testament

Jag undertecknad Alfred Bernhard Nobel förklarar härmed efter moget betänkande min yttersta vilja i afseende å den egendom jag vid min död kan efterlemna vara följande:

Åfvan hela min återstående förmögenhet försäljes realiserbara och förvandlas i säkerhet.

Paris den 27 November 1895

Alfred Bernhard Nobel

Alfred Nobel's will, *drawn up in his own hand and without lawyers' advice. The will, which left his fortune "to those persons who shall have contributed most materially to benefit mankind," was disputed by the family before being confirmed in the Swedish courts.*

without risk. As a powder it could be filled in boreholes from which the liquid blast oil would have flown out. In 1867 this second great discovery was patented in Sweden, and in combination with the earlier detonator provided the first rational technique for the use of explosives.

From now on the situation was changed. What for eighteen years had been only a chemical curiosity, and recently threatened to become a real danger to humanity, was now transformed by the technically trained Nobel family into one of the most revolutionary factors of the age, making possible mining enterprises previously unheard of, along with railway, tunnel and canal constructions—for example, the tunnels through the Alps.

Alfred Nobel had now to spend his time in continuous travelling from country to country for the establishment and supervision of factories and for the acquirement and protection of patent rights. He found use for his cosmopolitan education and solid knowledge of the chief European languages, and, last but not least, for his detailed knowledge of the manufacturing processes. He had talent enough to build a world-wide organisation with the capacity to produce the necessary amounts of explosives. During the years 1867 to 1874 the world production of dynamite rose from 11 to 3120 tons a year.

In spite of these activities a new discovery followed in 1875. It was blasting gelatin, also called rubber dynamite, in which 7% of low nitrated cellulose or collodion had been dissolved in 93% of nitroglycerin, forming a viscous semi-solid mass. The mixture was not so bulky as dynamite, had a greater blasting power, and was totally consumed on ignition.

The next patent was on smokeless gunpowder, the "ballistite," or the Nobel gunpowder, in which nitroglycerin was mixed with an equal part of guncotton (nitrocellulose). It exploded less violently than blasting gelatin, and thereby developed a propellent ballistic force when used in firearms without splitting the barrel. This invention of a propellent explosive, made in 1887, later came to be of the greatest importance in the manufacture of ammunition for firearms and ordnance pieces.

In England Nobel had met with no success in his attempts to get a licence for manufacture. Sir Frederick Abel, an adviser of the House of Commons on matters of explosives, exerted considerable influence in keeping Nobel's nitroglycerin away from England. In 1869 a Nitroglycerin Act was introduced forbidding the import, storage and transport of that substance in the country.. Only in 1871 was Nobel licensed to erect a nitroglycerin factory in Scotland.

Nobel came into serious conflict with the two

(*Continued on page* 139)

NEWS IN PICTURES — Home and Overseas

Textiles fair. *The Queen visited the Fibres Division stand at the National Men's and Boys' Trade Fair held at Earls Court recently. Among the new exhibits were the first-ever 'Terylene'/wool Scottish tweed cloth made of 35% 'Terylene'/65% wool by Ballantyne & Co. Ltd. and 'Terylene'/cotton slacks for sports wear*

New research laboratories. *Last month Sir Cyril Hinshelwood, President of the Royal Society, opened a new wing to Alkali Division's research laboratories at Winnington, where polythene was discovered in 1933. The new laboratory extensions, which have cost in the region of £220,000, increase working space by roughly one-third. In the background is the Division's Winnington Works, part of the complex of I.C.I. plants which supply about one-third of the world's export trade in alkalis*

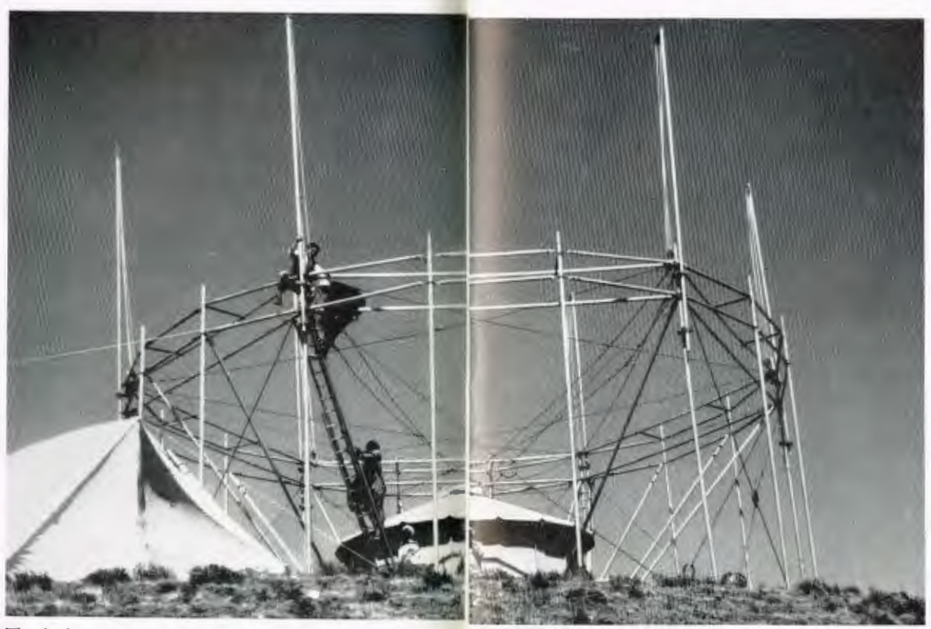
Visit to India. *Sir Alexander Fleck, Chairman, was a member of the Duke of Edinburgh's party when he toured India and Pakistan recently. During the tour Sir Alexander addressed the Indian Science Congress in Delhi. He is seen here being welcomed to the Congress by the Vice-president of India, Dr. S. Radhakrishnan. The Prime Minister of India, Mr. Nehru, looks on*

Tally-ho! *The Cleveland Hounds made a colourful scene when they met recently and gathered in the forecourt of Wilton Castle, Wilton Works. They were served with a stirrup cup before moving off*

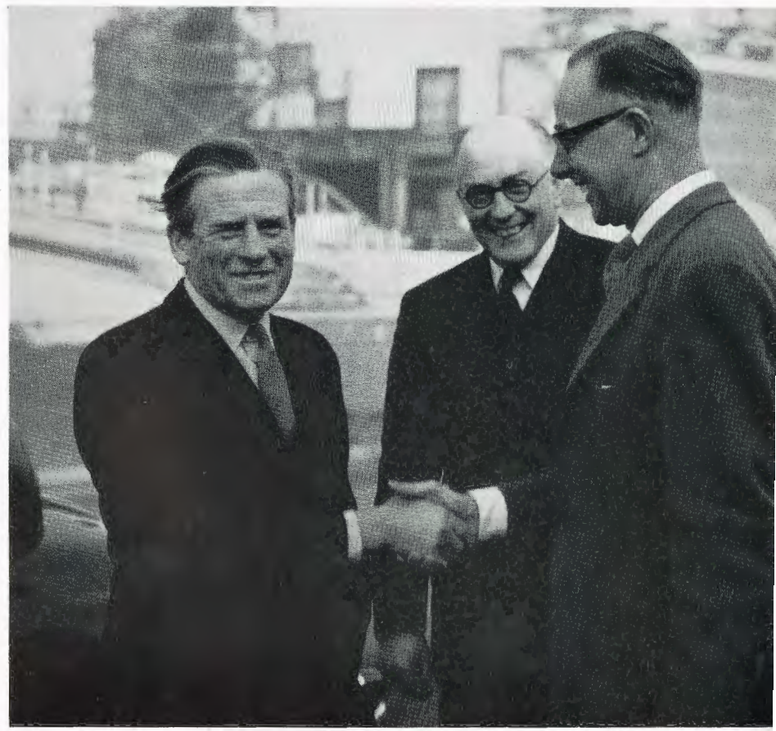
Plastics in industry. *Plastics Di vision's mobile exhibition recently rested its caravans on a site near Mi llbank. To the total of some 12,000 who visited it during previous tours Head Office added another 1800. Starting at its headquarters at Wel wyn, it has toured the British Isles, calling at Nobel Division, S.A.I., Wilton Works, and Billingham, Fibres and Dye stuffs Divisions*

Moment of decision. *During the indoor games contests at the Synthonia Junior Club at Billingham Division, Mr. W. J. V. Ward, Division chairman, "takes on" 12-year-old Peter Johnson at draughts. The scene was the occasion of an event to celebrate the opening of the new club premises*

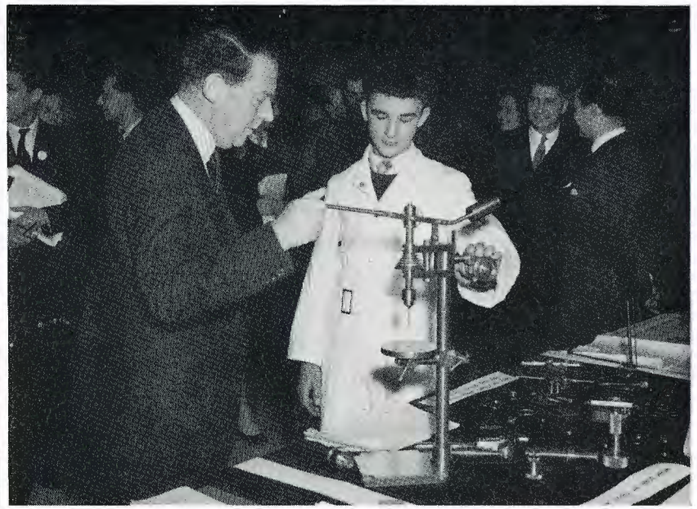
In Canada. *During a visit to C.I.L.'s Cornwall Works Mr. P. Allen, president, chatted with Ross Degan. The works was built as a result of an I.C.I. commission visiting Canada more than 25 years ago, of which Mr. Allen was a member*



Trek for tubes. *Final resting place for 'Kynal' 2½ in. aluminium tubes made by Metals Division was 10,000 ft. up to the peak of Jebel Marra in the Weste rn Sudan. The tubes, which were carried on the heads of native bearers, are to be used in the construction of a new VHF radio relay station being built to provide a telephone link between dista nt villages in Darfur Province*



Philosophical Society. *Field Marshal Lord Harding visited Wilton Works recently to address the Wilton Philosophical Society on Cyprus. He is seen here being welcomed by Mr. C. Archer, Engineering Works Manager (right) and Mr. R. E. Newell, Managing Director of Wilton Council (centre)*



Mr. Gaitskell at Wilton Works. *Mr. Hugh Gaitskell paid a flying visit to Wilton Works last month, where he met members of management, works councillors, trade union representatives and apprentices. Above, left: Mr. Gaitskell with (left) Mr. A. M. F. Palmer, M.P. for Cleveland, and Mr. J. C. H. McEntee, chairman of the Wilton Council. Mr. McEntee points out the safety flags flying at Piccadilly Circus. Above, right: Mr. Gaitskell talking to Mr. John Appleby, a craft apprentice at Wilton, and admiring some of his work*

Fire fighting aid. *A new device in which a radioactive source is used for checking the liquid level in carbon dioxide cylinders installed at various parts of the Billingham factory for fire fighting is being used here by Chief Fire Officer M. Haylock and Second Officer J. W. Small*

Union Chief goes down the mine. *Mr. Frank Cousins (second from left), General Secretary of the Transport and General Workers' Union, was another important visitor. During a tour of Billingham Factory he went down the Anhydrite Mine, where this picture was taken of him with some of the mine management and men*

Sugar sculpture. *At a recent Ardeer Factory staff dance this model of "Sceptre" worked in icing sugar by Mr. Colin McLellan formed part of the buffet decoration*

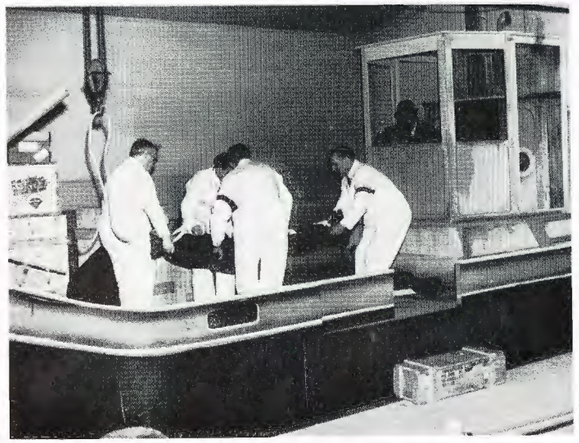
FIRST AID FINALS

Middlewich Works (*Alkali Division*), *in the finals again after an absence of 24 years, took first place. Here they receive the trophy from Sir Ewart Smith. Alkali Division entered 32 teams for the competition*

The runners-up, *Plastics Division's Hillhouse Works team, who came top in the team test, receive prizes of silver sweet dishes*

Mr. R. D. Broster *of the Middlewich team deals with an epileptic fit under the watchful eyes of Dr. L. Wills, Medical Officer of the Casualties Union*

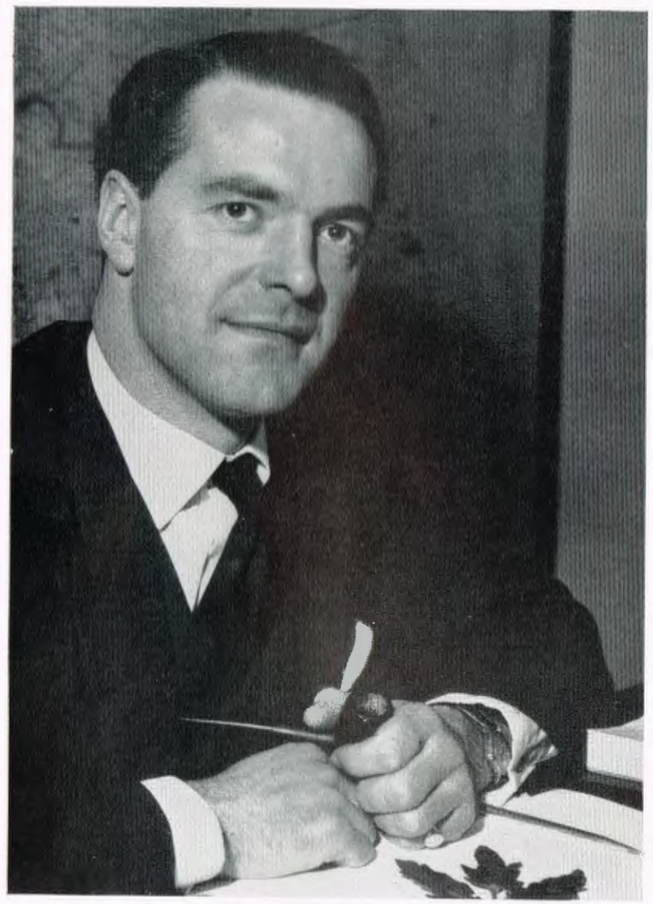
An accident *that could happen to anyone. A woman painting the porch of her house is stung on the cheek by a bee, falls off the ladder and is seriously injured. The first-aider is Mr. R. D. Allerhead*



The Bain Works (*Wilton*) *team treat a seaman trapped by a case of drugs which knocked him down as it slipped off the loading tackle. On the bridge, bearded for the occasion, is Dr. A. C. White Knox, the examiner*

BOBBY HOLMES

By Denzil Batchelor



THERE were two crucial moments in E. ("Bobby") Holmes's meteoric rise as a hockey player. The first came when, during the formative years of his education, the headmaster of Kingston Grammar School, deprived of sporting *lebensraum* for the national war effort, decided to concentrate on hockey rather than rugby football, because you could get more pitches on the grounds available.

The second came in 1947, when a young man scored six goals for the Portsmouth United Services in a morning match at Folkestone, on a day when England put up an inept performance against France in the afternoon. A selector happened to be watching and was struck by two things: first that the English forwards needed strengthening on the right wing; secondly that it was at inside right that young Holmes had given such a dazzling display. The result was that, a week after that morning's exercise, Bobby Holmes (without having played in any trial or final trial) found himself turning out at inside right for England against Wales.

He played well enough to appear in the final match of the season against Scotland. Next year he was restricted by a broken foot—his only serious hockey injury—to one international in Belgium. But in 1948–49 he played against Wales, Ireland and Scotland. A formidable record, especially when you consider that young Holmes was always a somewhat nervous performer; by his own account always less apt on that account to be at the peak of his form in international matches.

As a fact, this is a hard judgment to accept; for Bobby Holmes four times appeared for Cambridge against Oxford, taking part in the great game when two unbeaten sides met before 6000 spectators at Beckenham and Cambridge got home by a goal in one of the finest matches of the series.

Today Bobby Holmes works on the Agricultural Sales Staff of I.C.I. in Manchester, arriving there about two years ago after service as a "rep" in the Berkshire area. My interest in cross-examining him on his sport centred largely on the chance of solving the mystery of how hockey comes to survive and flourish *at all*. In a country offering Rugby and Association football the very existence of a third game seems superfluous: almost as anomalous as the existence of a third political party. What are hockey's special advantages? How does it maintain itself—and, above all, how is it that, when the *avant-garde* of the sporting world are intent on professionalising every game worth watching, hockey survives as a pastime which remains amateur to the very marrow of its bones?

For no sport on earth is more lilywhite; indeed, I should say that no other sport (not even rowing) is *as* amateur. The governing body refuses to allow prizes. No competition takes place for so much as a cup. Indeed, it is only in the past season that a county championship has been permitted at all—and then no trophy is permitted for presentation to the winners.

If you play for a club, you pay your subscription (probably between £2 and £5) and a *match fee*—it may be as little as 3s. a game—which covers the cost of marking out the ground and buying teas for both sides. For an away game you pay for your own petrol if you have a car; and if you are generous you may offer to buy petrol for the friend who drives you if you haven't. When Bobby Holmes first played for England you were allowed your railway fare and no more if playing away. In his second season this was increased by the payment of the bill for bed and breakfast at an hotel; but if you travelled up in the evening and had to buy yourself a meal on the train, this came out of your own pocket.

That sort of amateurism. Uncompromising. Nineteenth-century. If you like, antediluvian. Yet the fact is that poor men continue to play hockey in ever-increasing numbers. There must be very great intrinsic charms in the game to explain such unswerving loyalty in an increasingly materialistic age.

And, of course, there are. If you consider hockey *vis à vis* rugger or soccer, you will immediately be struck by the fact that you need more speed on the ground than in either of the football codes. (Notice that two halves of 35 minutes are played, as compared with two of forty minutes in Rugby and two of forty-five in soccer.) Hockey does not call for rugged strength: it does call for speed, artistry and ball control.

It is not surprising—and it is an excellent thing—that hockey's particular skills are liable to make a particular appeal to cricketers: players like Norman Yardley, Ken Cranston, F. R. Brown, John Dewes and Sharp, the young Yorkshire batsman, are all first class at both games.

I have said that it is a good thing that there is this bond between the two sports. The reason for this is that hockey's very survival often depends on the willingness

Bobby Holmes *about to score a goal in the* 1948–49 *season, when he played three times for England*

of cricket clubs to share their grounds with a hockey club for the winter months. That is as it should be; but, as Bobby Holmes pointed out to me, ideally hockey is a summer sport, to be played on hard, fast grounds—which is one of the reasons why India and Pakistan beat us and the rest of the world at the game which they alone experience under ideal conditions. Summer hockey! A revolutionary thought? Well, I will go a stage further, and say that *ideally* Association football should be a summer game too: and the fact that we never think of it in this light is one of the reasons we are always eclipsed in the World Cup.

Not only do we play our hockey at the wrong time of the year; the game also suffers from lack of a first-class headquarters, as well as from the fact that if you happen to play it on less than a well-kept ground the element of danger swells to a serious occupational risk.

Finally, is hockey a game for women? When I was *Picture Post*'s sports editor I spent two winters trying to obtain pictures to support the headline: *Hockey Girls can be Glamorous*. My researches were in vain; but Bobby Holmes shakes his head and chides me gently for not having tried hard enough or travelled far enough afield. It appears that if you go to South Africa (as Bobby did with our first touring team) before a big match you may well see a game between women hockey players who make Lollobrigida and Bardot look like a couple of goal-posts!

THE CYCLONE BOILER

By J. R. Willetts (Metals Division)

The cyclone boiler—so called because a miniature cyclone takes place inside the combustion chamber—has two chief claims to superiority. Firstly, it is highly efficient, yielding up to the steam nearly 90% of the energy of the pulverised coal. Secondly, waste disposal is much less of a problem, as there is no dusty ash to get rid of. Instead, the slag consists of hard angular lumps about the size of peas and looks like pieces of black glass, for which there may be use in road-making.

A CYCLONE is defined in the Oxford Dictionary as a "violent hurricane of limited diameter." That definition describes accurately the state of affairs which exists in the combustion chamber of the new cyclone-fired boiler which is now operating at the Kynoch Works of Metals Division. The boiler was completed towards the end of 1956 and was the first to operate in this country. There are now four others working, three of which are owned by I.C.I. Several more are under construction.

For the last twenty years most of the large boilers installed in this country have burnt finely ground coal—technically called pulverised coal—by igniting it as it emerges from large burners something like gigantic blow-lamps. Boilers employing this type of combustion are highly efficient, but unfortunately it is very difficult to find somewhere suitable to dump the very fine ash left after the coal has been burnt. Every ten tons of coal leave about one ton of ash. As the electricity generating stations of this country burn over 40,000,000 tons of coal a year, the problem is considerable.

During the late 1930s the Americans devised a type of combustion chamber in which the temperatures are so high that the ash is melted and runs out in liquid form. This is called the cyclone combustion chamber. The diagram opposite shows its principles of operation.

Finely powdered coal (about the particle size of castor sugar) is blown into the cylindrically shaped combustion chamber by a primary (or carrying) air stream and is immediately brought into contact with a secondary (or combustion) air stream travelling at about 250 m.p.h. at a temperature of about 550° F. The direction of the air and coal entry imparts a sideway swirling motion, throwing the fuel particles on to the walls, where they are burnt almost instantaneously at about 3000° F. The molten ash adheres to the wall and runs down to the bottom and out through a hole.

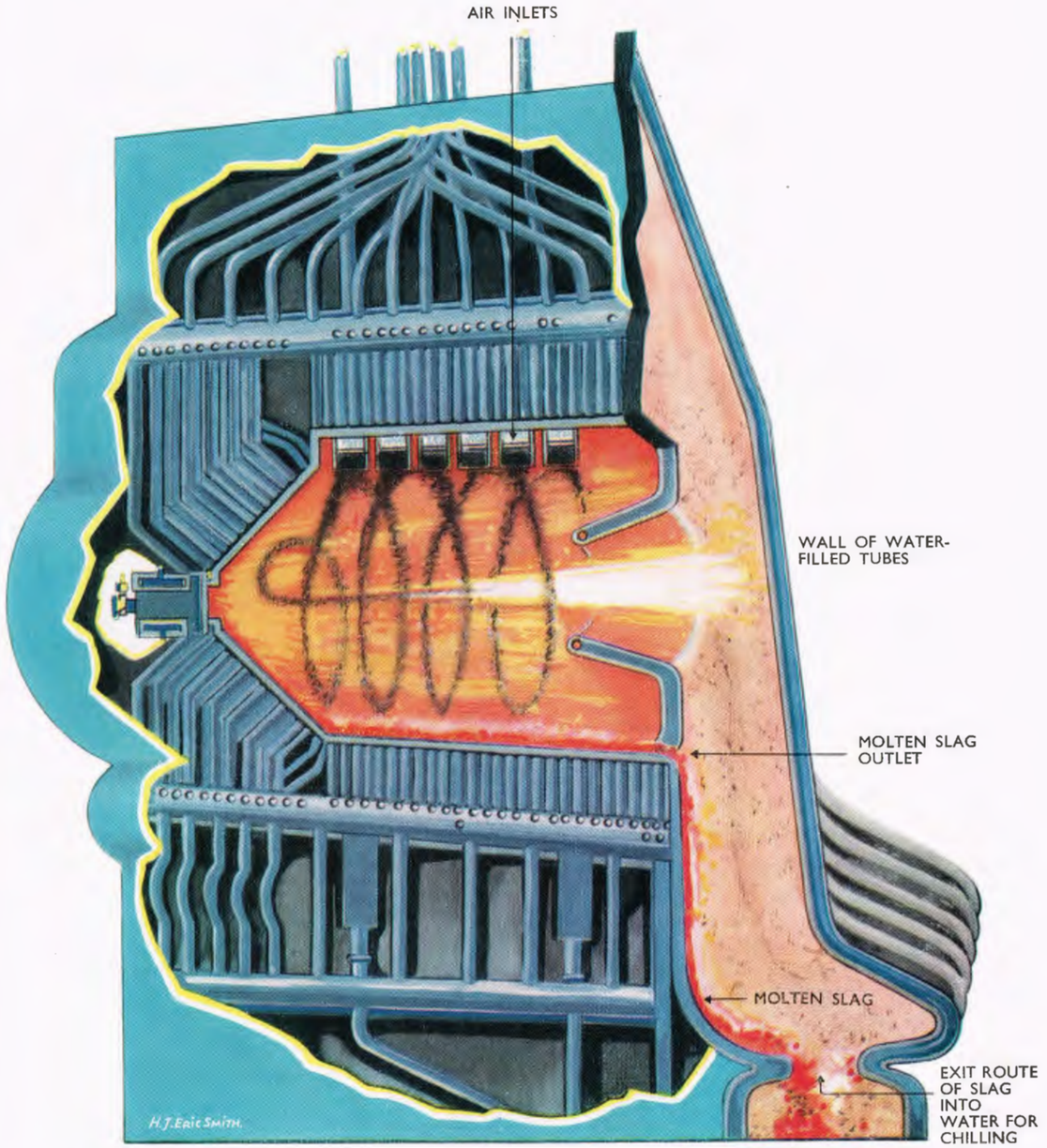
The walls of the chamber consist of a lining of special temperature-resisting material laid on the surface of tubes through which water passes to keep them cool. The water circulation and the quality of the water are of primary importance, as a blockage would melt the tubes.

The liquid slag runs out into a water-filled chamber; and the sudden chilling by cold water causes the molten slag to disintegrate into small angular fragments about the size of peas and looking like black glass. These pieces are clean and readily disposable on tips and are not blown about by the wind. In Germany some slag is used for road-making, but no commercial use has yet been found in this country although outlets are being investigated.

From the cyclone the hot gases, still at white heat, pass into the remaining sections of the boiler, where the heat of the gas is transferred through tube walls to the water and so generates steam. By the time the gases leave the boiler their temperature has been reduced to just a little hotter than boiling water, and the coal will have given up to the steam nearly 90% of its heat energy.

The elimination of the dust-disposal problem is perhaps the biggest advantage of the cyclone boiler. Another big advantage is that the extreme turbulence within the cyclone enables the fuel and the air necessary for its combustion to intermingle to a greater extent than ever before. Consequently, the quantity of air required for combustion is reduced to the absolute minimum; and as some of the heat in this air is eventually passed up the stack, heat losses through the stack are small. Unfortunately, the high fan power needed to blow the air into the combustion chamber reduces some of this gain.

When a few years ago new boiler plant was required at Witton, the attractive features of a cyclone-fired boiler led to a decision to install this type. As the boiler was wanted quickly, a standard boiler design was chosen to which the cyclone could be easily added. Experience has quickly shown that despite some teething troubles its principles of operation are sound.



Nightfall in New York

By Scott Forsyth (Heavy Organic Chemicals Division)

WHETHER, as its citizens so often claim, New York is the greatest city in the world, bigger than either London or Tokyo, is arguable (depending on where the boundaries are drawn), and whether its characteristic architecture is beautiful or merely grotesque is a matter of opinion; but there can surely be no dispute that at night no other place on earth presents such a spectacle as this remarkable city, capital of nowhere, not even of its own state—except perhaps of the world.

To look down on the city from one of its high towers, and see for the first time the lights come on as the afternoon fades, is unforgettable; to watch the twinkling patterns break out on the solid buildings and along the streets against the background of a luminous sky; and then, as the sky goes dark, to be left with just the glowing fantasy of the lights themselves, form without substance. Nor, speaking for one temporary citizen at least, does this brief nightly transmutation lose its magic, however often witnessed. It is brief because, at the latitude of New York, the day dies quickly once the sun is down; there is only a short dusk, no long twilight such as we have in England, and the whole transition from one city to another takes no more than half an hour.

Most cities are essentially two-dimensional, the heights of the buildings being relatively small, so that at night the lights lie in a shallow horizontal plane; in New York, however, where the skyscrapers rear high, the band of lights is much deeper, and there is a very marked 3-D effect.

Nowhere is there greater pressure on space than on the long (13 miles) thin ($1\frac{3}{4}$ miles average) island of Manhattan, the central borough of the city. Here is concentrated the control of America's industry, and all the time more and more organisations are moving in. The consequence of this is that in those parts of the island where commercial development is permitted land now has a fantastic value, and only the most advanced types of building are justifiable; in mid-town, where there has been a tremendous surge of new building, land may fetch over $200 a square foot—or almost $10 million an acre.

In such circumstances the only way to make enough room for all the office workers is to stack them high, and this is what has been done; buildings which will not permit an adequate heads-per-acre loading, however sound otherwise, are pulled down and replaced by something taller. Thanks to the solid rock lying under most of Manhattan there is little difficulty, stability-wise, in erecting buildings of 80 storeys or more, though for various reasons the standard height is now running at about half this, and the Empire State Building alone (and perhaps never another) has been taken up that far.

Basically, a skyscraper is a steel girder structure (formerly riveted, now usually bolted together, among other things to avoid noise during construction) with concrete floors, flimsy partition walls and an exterior curtain wall (i.e. taking no stress). For many years stone, brick and concrete were used for the cladding, the windows being relatively small and separated horizontally and vertically from each other, but more recently, following a fashion set by the Lever Building some eight years ago, there has been a tendency to increase the window area, banding it horizontally between spandrels of metal (bronze, aluminium, stainless steel), sometimes with a ceramic finish.

Thus, returning to the lights, the older skyscrapers show up as rectilinear patterns of glowing squares or oblongs, while the newer ones give the appearance of glowing more evenly all over. Compare, for instance, the pattern of the General Electric Building's individual windows with the golden radiance of the new Seagram Building beside it, one of the most striking features of the night skyline, whose lights, incidentally, are left on throughout the evening and then turned off simultaneously, floor by floor, by a master switch at midnight.

Of all the tall towers, the Empire State Building

Looking west *along East 49th/50th Streets. Straight along the block on the left is the Waldorf Astoria Hotel, right centre is the General Electric Building, and on the extreme right is the new Seagram Building.*

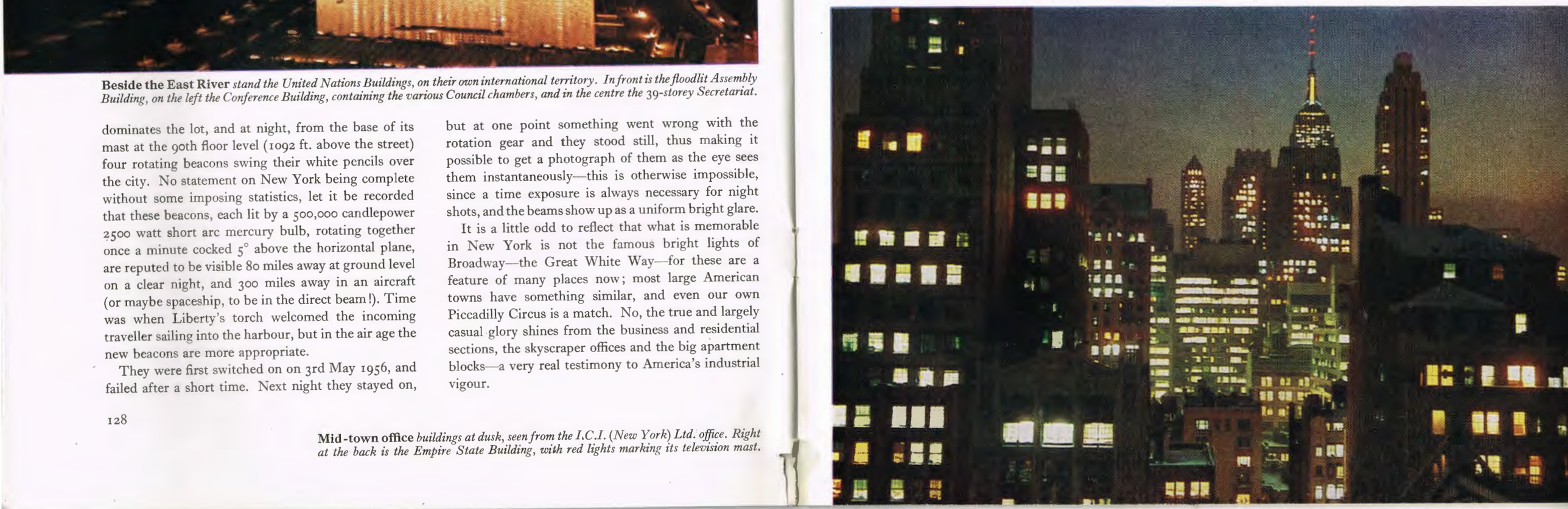
Beside the East River *stand the United Nations Buildings, on their own international territory. In front is the floodlit Assembly Building, on the left the Conference Building, containing the various Council chambers, and in the centre the 39-storey Secretariat.*

dominates the lot, and at night, from the base of its mast at the 90th floor level (1092 ft. above the street) four rotating beacons swing their white pencils over the city. No statement on New York being complete without some imposing statistics, let it be recorded that these beacons, each lit by a 500,000 candlepower 2500 watt short arc mercury bulb, rotating together once a minute cocked 5° above the horizontal plane, are reputed to be visible 80 miles away at ground level on a clear night, and 300 miles away in an aircraft (or maybe spaceship, to be in the direct beam!). Time was when Liberty's torch welcomed the incoming traveller sailing into the harbour, but in the air age the new beacons are more appropriate.

They were first switched on on 3rd May 1956, and failed after a short time. Next night they stayed on, but at one point something went wrong with the rotation gear and they stood still, thus making it possible to get a photograph of them as the eye sees them instantaneously—this is otherwise impossible, since a time exposure is always necessary for night shots, and the beams show up as a uniform bright glare.

It is a little odd to reflect that what is memorable in New York is not the famous bright lights of Broadway—the Great White Way—for these are a feature of many places now; most large American towns have something similar, and even our own Piccadilly Circus is a match. No, the true and largely casual glory shines from the business and residential sections, the skyscraper offices and the big apartment blocks—a very real testimony to America's industrial vigour.

Looking south *from the author's apartment. Nearly all the great mid-town skyscrapers are visible, between two and three miles away. The three tallest, from left to right, are the Chrysler Building, the Empire State Building with its beacons, and the R.C.A. Building in Rockefeller Center. The glow in the sky (right) is from the lights of the Times Square section of Broadway.*



Mid-town office *buildings at dusk, seen from the I.C.I. (New York) Ltd. office. Right at the back is the Empire State Building, with red lights marking its television mast.*

I.C.I. AND THE UNIVERSITIES

By R. B. Strathdee (Aberdeen University)

Industry—and I.C.I. in particular—makes today a big impact on university life. On the one hand, the universities are heavily assisted by industrial grants and fellowships. And on the other hand, the best science students are actively wooed to enter industry, thus thinning still further the already scanty ranks of new recruits for science teaching. Some of the problems posed—and today widely discussed—are here sketched by Dr. R. B. Strathdee, Reader of Chemistry at Aberdeen University.

A SPHERE of life where the influence of I.C.I. is very much felt is that of the universities. Handsome grants have made possible the institution of new departments such as that of the History and Philosophy of Science in the University of Aberdeen; the award of Fellowships has encouraged research and opened up new fields of investigation; our libraries have been enriched, not least by that delightful publication *Endeavour*; special items of scientific equipment have been put at our disposal and inaccessible and expensive chemicals made available; members of our staff have been stimulated by visits from I.C.I. Divisions; our students have derived valuable experience from attendance at vacation courses, and our teaching has been enlivened by the loan of films and gifts of lecture table specimens.

A sort of fairy godmother

In the universities we are grateful for these kindnesses; all too frequently we are treated as guests in our own cities. Are we in danger of becoming dependent on such generosity, to look on it as a right and not a privilege?

How often have we not sat round council tables discussing ways and means of financing schemes when someone suggests that "industry"—a sort of fairy godmother—should be asked to provide the wherewithal? What is to happen if industry undergoes a severe recession? Some of us recall that in the early thirties I.C.I. had virtually to suspend the recruitment of chemists and even terminated research projects under contract at a number of universities. Only last year the Government had to take drastic action to stabilise the country's finances. And suppose a government proposed to nationalise the larger chemical companies—would these sources of benefaction dry up? Personally, I would prefer I.C.I.sation to nationalisation.

Sir Alexander Fleck in his thoughtful presidential address to the British Association stated that if our universities are to expand in order to accommodate everyone who could benefit by such an education we shall need to contemplate an annual expenditure of the order of £1,200,000,000. I have already acknowledged the debt of the universities to I.C.I.—and, of course, to other industrial companies. But the generosity begins at a level earlier than the university one. Through the Industrial Fund for the Advancement of Scientific Education in Schools many schools are benefiting from more modern equipment and accommodation. In the Britain of the eighteenth century, "a land of art and elegance," aristocracy functioned as a patron of art and letters; today we live in a land of science, with industry assuming the role of patron.

Industry requires more and better scientists, and it is one of the functions of the universities to provide these. During the spring term, recruiting teams from various companies migrate from university to university, generally by arrangement with the Appointments Officer. Universities appear to differ in the way in which they tackle this problem, for it is a problem.

A symptom of deficient vitality . . .

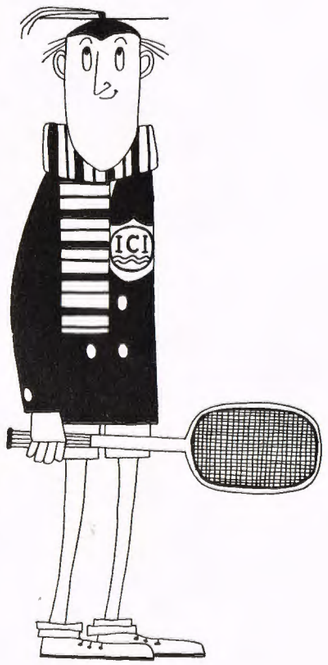
In Aberdeen, in order to foster contact with industry, the Chemistry Department arranges visits direct with those chemical firms and divisions who are interested in our students and in our work. To lessen the interruption in teaching, these visits, which in the past took place on any day throughout the term, were concentrated on Wednesdays and Saturdays; but later, as they were unpopular with student and visitor alike, Saturday interviews were stopped. There are only ten Wednesdays available in the spring term (four are allotted to I.C.I. Divisions), and accordingly it is necessary to spill over into the summer term.

Many stimulating discussions have taken place with our industrial visitors round the luncheon table. Sometimes the conversation has turned on industry's need for young men of character no less than learning, and Robert Louis Stevenson has been quoted. "Extreme business," says Stevenson, "whether at school or college, kirk or market, is a symptom of deficient vitality; and a strong faculty for idleness implies a catholic appetite and a strong sense of personal identity."

This article is not another apology for idleness, but I wonder whether today science students are allowed sufficient time to browse at will. On occasion it is a good thing to play truant from the laboratory and to take an unselfish and sympathetic interest in the affairs of others and the world around us.

When I was at college almost 75% of my fellow graduates in science entered the teaching profession, the greater number in the schools. Today not 20% of our young chemistry graduates are interested in teaching: they are wooed by the attraction of research and industry—by the arguments of our Wednesday visitors—and only the odd one or two decide to adopt teaching as a career. This is not merely unfortunate, as one of I.C.I.'s advertisements suggests—it is serious. The Industrial Fund is providing better conditions in the schools and this may help a little, but we feel that the teaching profession must become more militant in its recruitment; it must break into those Wednesday forenoons of the spring term, at present practically entirely in the hands of industry.

On the other hand, this problem raises another: should the schools provide a broad education or a vocational training? When we were at school we had little physics and chemistry, some languages, but much English and mathematics. Today, with specialisation deep in the schools, the scholastic product is apt to have a narrower outlook, with a narrower potential. If industry attracts the majority of our science graduates, will the schools be forced to provide a basic, less specialised education? And should not such scientific staff as are available be concentrated solely on those pupils who do propose to pursue science after school?



In Aberdeen University we are hoping to get advanced chemistry courses approved in the Faculty of Arts; it is open to debate whether this would produce a type of science graduate acceptable to industry, but it is at least probable that it would relieve the shortage of science masters for the junior classes.

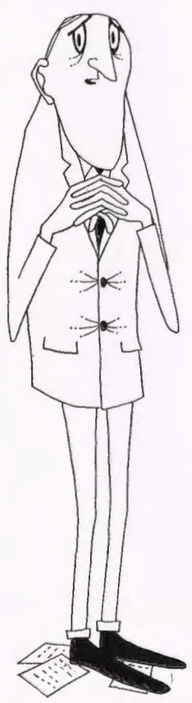
UNACCUSTOMED AS WE ARE . . .

By Michael Danckwerts

All of us have at times been bored by a bad speaker—and most of us exhilarated by a good one. In the old days you had to suffer the bad speaker in silence. But today you can tell him to go on an I.C.I. Speech Training Course, where students criticise one another in an orgy of unvarnished truth-telling. Over 200 SPC trainees are now at large in the Company.

In the course of every year hundreds, perhaps thousands, of speeches are made by I.C.I. people—speeches at courses, after-dinner speeches, training speeches, speeches to outside organisations, speeches at meetings and in committees. Many of them are not good speeches, and a few of them are, quite plainly, bad speeches.

It was the recognition of this fact that led the I.C.I. Education Department to start its Speech Training Courses. Since then more than 200 people have taken the course and are now, it is hoped, making speeches that delight rather than bore or infuriate their audiences.



Mr. A

However badly a man speaks, he is never likely to learn the ghastly truth from his audiences. They are incurably polite, and the audible snore or the visible sneer is rare. A speaker may inflict on his audience the whole gamut of public speaking vices, from facetiousness to the fidgets, but only the chilling fact that he is never asked again tells him that he has failed. The Speech Training Course is a unique opportunity for speakers to learn the unvarnished truth at last. It may be hard for them to swallow, but for the sixteen shorn lambs that come to the I.C.I. Staff Training College at Warren House, Kingston, the harsh wind of criticism is tempered by the fact that their critics include the other victims. Each syndicate of eight has an instructor to guide it, but in the main it is left to the members of the syndicate themselves to offer criticism.

When the course begins most of the victims admit, either explicitly or merely by a certain pallor and silence, to being nervous. Nervousness is undoubtedly the bugbear of most aspiring speakers, varying in degree from vague apprehension to blind panic. Some people not only feel nervous but suffer definite physical symptoms—dry mouth, blurred vision, knocking knees—that make things go from bad to worse as they mispronounce words, misread their notes and knock over the water carafe. One of the first things the students learn from the instructing staff is that even the best speakers feel nervous—that, in fact, when a man ceases to feel some tension and anxiety on confronting his audience he is well on the way to being a bore.

There is no magic formula to dispel nervousness, and no one expects or even hopes that the four-day Speech Training Course will produce a dramatic access of confidence in the students. What it undoubtedly does is to teach them that nervousness and even repeated failure can be expected in the years of apprenticeship. The pill is sugared with this axiom: "Get your message right, and you have little to fear. Most audiences want the speaker to succeed as much as he does himself."

This is some consolation to the students as they rise to their feet for the first time. In a gentle, informal little exercise each man is asked to speak briefly about his own job. Mr. A, a lion in his own Division, reveals as soon as he opens his mouth that he is a mouse when it comes to public speaking. Mr. B, whose job involves many informal talks to groups of visitors,

Mr. B

admits that he probably bores them, and wonders why. Over-confidence is Mr. C's vice, and he is noted down by the rest of the syndicate as a good target for future criticism.

Four days later A and B are addressing the whole course with something like nonchalance. A has developed into a warm and quite effective speaker, B has begun to find out why he was boring his audiences. C's self-esteem, now slightly punctured, no longer works its way to the front of all his speeches.

How is it done? There is no miracle about it. What has happened is that A, B, C and the others have been set on the right lines and given the opportunity, for the first time in their lives, of *practising*. They have learned their worst failings and gained a certain amount of confidence. Above all they have learned that speech-making is not like falling off a log. Making speeches, most people think, is something that ought to come intuitively to someone of average intelligence, and nearly everybody believes that he need not bother, need not prepare, that something will make his speech "all right on the night." Probably the most telling point in the curriculum is this: "One hour of preparation may have gone into every minute of a good speech."

As soon as this phrase is let loose the students begin to look haunted. They have come to the course with notes for a fifteen-minute speech on some great man, based on a biography sent to them in advance. Will their notes, written illegibly on the back of a bus ticket, carry them through? They begin to wonder. Some of them are hardly seen again until their great moment arrives, unless it is in the garden, mouthing quietly to themselves, or in their bedrooms, scribbling furiously.

The use of notes is considered important enough to be the subject of a talk by one of the instructors. How much do you write down, and in what form? The short answer is: as much as you need to give you confidence, and in a form that will give you, at a glance, your next lead. Some students wonder if it is bad tactics to write out the whole speech. The answer to that is: write out the speech if you must, but use the script only as an insurance policy. To an audience no one is more tedious than the man who literally reads his speech: not for nothing does the House of Commons forbid it.

Each student makes at least six speeches during the course and, in the main, practice and theory alternate. A talk on committee work is followed by a session in which syndicates go into committee to dissect the speech of an eminent man, and the elected chairman tries to put into practice the pointers on committee work given by the instructor. Instruction in "thinking on your feet" is followed by an exercise in which students are presented in turn with awkward situations which must be retrieved impromptu. Here is one of the more intriguing:

You are the chairman of the Labour party in Basingstoke. Mr. John Hunt, a Conservative, who is a freeman of the borough, has just retired after 40 years' continuous service on the council. There has been a public fund raised to present him and his wife with an A40 motor car. At a meeting in the Town Hall you are asked to hand a cheque to Mr. Hunt enabling him to complete the purchase of the car from Messrs. Bunting, the local Austin agents. Mr. George Bunting, the managing director of this firm, is present; he has promised a year's free servicing for the car. The Mayor of Basingstoke is in the chair—Alderman Bennett, another Conservative.

. . . that ease and charm

Mr. and Mrs. Hunt have three children—a daughter who is matron of the cottage hospital, one son in business as a solicitor in London, and a younger one serving in the army in Malaya. You yourself had a heated public debate fifteen years ago with Mr. Hunt on the subject of nationalisation, and at election times Labour and Conservative outdoor speakers are well known to have tried to drown each other's eloquence with noisy loudspeakers. Mr. Hunt has never changed his style of dress since his young days. He always wears Gladstonian wing collars.

You have to make a suitable speech, lasting three or four minutes, in honour of Mr. Hunt but without, of course, obscuring the fact that you continue to hold views opposite to his own.

Good writing is said to be merely good manners. The same is probably true of good speaking (although good writers do not necessarily make good speakers, or vice versa). The essence of both impromptu and considered speaking is that the speaker should make sympathetic contact with his audience. The senior instructor on the Speech Training Course, a speaker of wide experience who radiates just that ease and charm the students hanker after, makes the point that a speaker has certain obligations to his audience: to plan and present the matter logically, to prepare thoroughly, to consider the tastes and susceptibilities of his hearers. It is not enough to unload information: the speaker must lead the audience to a conclusion with him.

Nearly every student must start the Speech Training Course by wishing that the floor would swallow him. But the agonies of embarrassment that he expects to undergo, and perhaps does undergo, are the least abiding impression of the course. There can be few students who do not return to their Divisions and Regions feeling that in their few days at Warren House they have taken some useful steps towards mastering a worth-while art.

People and events . . .

New Division Chairmen

THE announcement of the appointments of Mr. Harold Smith (General Chemicals Division chairman) and Mr. E. J. Callard (Paints Division chairman) came too late for us to do more than include a brief mention in last month's *Magazine*. Here now is the full story.

Mr. Harold Smith takes on the duties of chairman after two years as a joint managing director of the General Chemicals Division. Before that he was with Dyestuffs Division for 28 years—he joined Blackley Research Department in 1929 after graduating in chemistry and chemical engineering at Imperial College, London.

Early in his career with Dyestuffs Division he was seconded for several years to the synthetic indigo factory at Ellesmere Port, a nursery of talent which at that time counted the present Dyestuffs Division chairman, Dr. Avery, and Mr. P. K. Standring among its staff. In 1939 he took part in the technical mission to the U.S.A. that was a prelude to Dyestuffs Division embarking on nylon manufacture. He was appointed to the Dyestuffs Division board in 1952 and became managing director of that Division in 1955.

* * *

Mr. Smith is noted among his colleagues for his almost Churchillian appetite for hard work and for the ability to make his mind up quickly. There is something too of the Gallic love of stern logical argument in his make-up, and he would probably have made an excellent criminal lawyer. His main relaxation is in gardening and horticulture, and his knowledge and expertise in these subjects is probably on a par with his knowledge and ability in the chemical and chemical engineering fields.

Mr. E. J. Callard, who has succeeded Dr. Gourlay as chairman of Paints Division, came to Slough from Billingham in 1947 as deputy chief engineer and four years later joined the Division board as Engineering Director.

Mr. E. J. Callard

Mr. H. Smith

He made his impact on Paints Division just at the time when improvements in paint manufacture plant were badly needed to support the growing demand for the Division's products. The transformation of the manufacturing site at Slough from a traditional paint works to a modern highly mechanised factory owes much to his enthusiasm and drive. To this achievement can also be added the current modernisation of the Stowmarket site, once an old silk factory.

Outside his work he is a keen golfer, plays a useful game of snooker or billiards, and on the playing fields of Paints Division's Duffield House can often be seen wielding a useful croquet mallet. He has travelled on Company business in the U.S.A. and Canada and South Africa and spent three months at the Harvard Business School.

Optimism in Research

WHEN the President of the Royal Society, Professor Sir Cyril Hinshelwood, opened the new £220,000 wing of the Alkali Division Research Laboratories at Winnington on 4th March, he had these observations to make on industrial research.

Stressing the need for optimism in research, he said a research department must give real practical common-sense service to the Works in general in a way which makes everyone feel he is earning his keep, but at the same time it must also pursue some imaginative lines.

"It is very important to back your intuitions," he said. "You must have a flutter sometimes."

Sir Cyril, who was introduced by the Division chairman, Mr. J. K. Batty, said there was an "absolutely inseparable connection" between pure and applied science. There was no doubt that the admirable relations which had grown up between the industrial and the academic worlds was of real importance in our national life.

Sir Cyril said he always looked upon Winnington as being like the mother country of the I.C.I. Commonwealth. Like many other mother countries it had sent many of its sons to the Dominions, where they had done very well. Just as, within the British Commonwealth, the mother country did not repine at the loss of ripe fruit which had dropped off, it started up new things. "Alkali Division will start up and develop new projects which, we hope and believe, in the course of time will be as successful as the old ones," he declared.

House-warming

WHEN **Mr. Reg Meredith**, a leading fireman at Summerfield Research Station, and his family recently moved into their new home the occasion was celebrated with a very special house-warming party. Theirs was the first house to be completed under Kidderminster's "do-it-yourself"

housing scheme. The Mayor and Mr. Gerald Nabarro, M.P. for Kidderminster, were among the many guests who crowded into the three-bedroomed, semi-detached house. The full scheme of thirty-one houses is scheduled to be completed in three years—each man works twenty-one hours a week in his spare time on the project, and work proceeds day and night.

Mr. Nabarro, who performed the opening ceremony, described the efforts of Reg Meredith and his thirty partners as being "equal to the pioneering spirit of the days of the first Queen Elizabeth."

New Book

ANOTHER book by **Dr. James Taylor** has just been published as a Newnes Technical Survey. The last, of which he was joint author with Dr. P. F. Gay, was a comprehensive treatment of British coal-mining explosives. In his new book Dr. Taylor's purpose is to bring together the results of much research on solid chemical compositions which are sources of power for rocket propulsion and mechanised operations. Explosives which bang and shatter have their place, but the author is as much concerned with reactions that generate power at a more leisurely pace than in an explosion.

Most of the work described in the book is intimately familiar ground to the author, because it was done during his years in Nobel Division Research Department, first as a young physicist, then later as section leader, head of Blasting Explosives Research, an assistant Research Manager and Research Manager.

The common thread of purpose in this work, says Dr. Taylor, was "to use chemicals as a source of energy to replace human effort and to tame explosives, as it were, in order to carry out a large number of operations for which they are specially fitted." *Solid Propellent and Exothermic Compositions* surveys this very extensive field. There are chapters on rocket motors and solid fuels for them.

IN BRIEF

A 'Perspex' Bath for Mr. Krushchev. During his visit to the Leipzig Trade Fair on 6th March Mr. Krushchev admired a light blue bath made of 'Perspex' which was one of the exhibits on the I.C.I. stand there. It was offered to him as a gift, and he accepted it.

Zips go a Million. The 'Lightning' Fastener factories at Witton and Aldridge Road, Perry Barr, achieved their accident-free target of 1,000,000 hours on 26th February. This is the second time they have hit the target, the previous occasion being in 1957.

£9000 Saving. Barclays Bank have sliced £9000 a year off their postage bill by using nylon instead of calico for their letter bags. They have some 3000 bags in use each day.

More 'Nyzips.' Lightning Fasteners Ltd. have increased their over-the-counter range of 'Nyzip' nylon fasteners. Up to now they have been available only in 8 in., 9 in., and 12 in. lengths in black and white and nineteen colours. Now 4 in., 5 in., 6 in. and 10 in. lengths and another seven shades have been added.

New Look for Gardens

ARE your roses your pride and joy? Do you aspire to growing prize-winning mammoth chrysanthemums or vegetable marrows? Or perhaps you merely struggle to keep the lawn and flower beds tolerably tidy and weed-free. However high or low your horticultural aims, a free booklet about I.C.I. garden products, available from garden shops throughout the country, should prove a boon.

Garden for your Family is mainly about getting rid of pests and weeds and similar troubles—without trouble. The main fruit, flower and vegetable pests and diseases are illustrated (in colour) to help you recognise what your plants or trees are suffering from and the appropriate remedy is listed. Also packed into the sixteen pages are notes on pruning, bottling fruit, and growing crops under glass.

"I.C.I. Garden Products" is the new name for the range of weedkillers, fertilisers and insecticides made by Plant Protection Ltd.

Mr. Cheveley Retires

THE chairman of Central Agricultural Control, **Mr. S. W. Cheveley,** retired on 31st March. Accounts of his career in I.C.I. have appeared in the Company's bulletins and in the national and agricultural press. There is therefore no need, and he would not wish it, to give the record again.

He has always had a fantastic capacity for sheer hard work. He wrote his book on grass-drying in a week and his

ANNUAL HOLIDAYS

The following new holiday arrangements have been announced.

Staff. In addition to the existing qualifications, 35 or more years' service with the Company (irrespective of salary) will qualify a member of the staff for 4 weeks' holiday a year.

Payroll Employees. By agreement with the trade unions signatory to the Company's agreements on working conditions: (1) All payroll employees with 35 or more years' service are to get four weeks' holiday with pay; (2) 25–35 years' service, three weeks; (3) 20–25 years' service, two weeks and three days. Previously the general holiday provision for factory payroll personnel was two weeks with pay.

Eligibility for the longer holidays comes into force the year after the qualifying service has been attained. Employees with the required service on 31st December 1958 will therefore receive increased holiday during 1959.

wartime best-seller, *A Garden Goes to War*, in three days. He never went to a meeting without doing his "homework," even if it meant sitting up all night reading the papers to be discussed. He has travelled all over the world, including right round it, for the Company, and on these trips and in the unlikeliest places could be found at some stage on most days with his sketching pad and box of watercolours. He also suffers from the strange delusion that he is a fisherman, and this has proved incurable.

He will be greatly missed, but his friends will think of him driving onwards with drainage schemes and cowshed improvements on his farm in Kent or, every Friday in the Overseas Service of the B.B.C., crying out "Hello, Schenectady, this is Steve Cheveley calling the farmers of the United States."

* * *

Mr. R. A. Hamilton succeeded Mr. Cheveley as chairman of Central Agricultural Control on 1st April. This new appointment is in addition to his duties as Development Director of Billingham Division.

Mr. Hamilton is an Ulster man and holds first-class honours degrees of Queen's University, Belfast, in chemistry and agricultural chemistry. Added to this he spent a year doing post-graduate work at Cambridge and then worked for a spell at the Imperial College of Tropical Agriculture, Trinidad. He then spent six years on the

(Photos: Douglas Glass)

Mr. Cheveley *Mr. Hamilton*

staff of the Ministry of Agriculture in Northern Ireland, later becoming C.A.C. Agricultural Development Director, in which post he built up a big reputation in the farming world for his advocacy of grass as the most economic food for British livestock.

Lap of Honour

WHEN 72-year-old **Mr. Syd Harrowing** recently celebrated his golden wedding, nothing in all the day's festivities pleased this former works loco driver more than the treat arranged for him by the Rail Section, where he now works in the rail control

room. It was the chance to drive one of the new diesel-electric locos introduced in Billingham Factory since he gave up driving and took an indoor job.

Mr. Harrowing has been at Billingham since 1928. He started there as a loco driver after working for two years on the railways in Ceylon, but long before this he had earned his living in a more unusual and exciting way. As a boy he was on the stage as a professional acrobat and tumbler, and before he left the theatre at 17 he had appeared with such famous names as Charlie Chaplin, Marie Lloyd and George Robey.

So Little yet So Much

WHAT is the difference between sili*con* and sili*cones*? The answer is that silicon is an element, one of nature's basic building bricks of which all other substances are composed. It does not itself occur raw in nature but is found only in compounds. However, these are very common, the commonest of all being sili*ca*, the main constituent of sand. Silicones are new, man-made chemicals: silicon is one of the constituents in their very complex chemical structure.

Silicones, known to most people for their use in floor and car polishes, are made by Nobel Division at Ardeer Factory. Pure silicon has recently come into importance in the manufacture of transistors, which are fast replacing conventional valves in radio sets, electronic "brains," deaf aids and rocket equipment. The new silicon plant on Merseyside which has just been brought into operation by General Chemicals Division is the first bulk production of this material, which costs well over £100 per pound, in this country. By the middle of the year, it is announced, capacity will approach 4000 lb. a year, and plans are already in hand for much larger production.

General Chemicals Division will be exhibiting silicon at the International Convention on Transistors at Earls Court on 21st–27th May, and will welcome visitors.

First Again

General Chemicals Division also have another new plant under construction at Cassel Works, Billingham, for the manufacture of acrylonitrile. This too is the first large-scale unit of its kind in Britain and should be in production by the end of the year.

Most of the production will go to the synthetic fibre industry, but there is also a good market in the making of resins, such as our own 'Butakon' synthetic rubber made by Plastics Division.

Mr. Tweedy Retires

WITH the retirement at the end of last month of **Mr. W. L. C. Tweedy,** President of I.C.I. (Peru), after 30 years' service, the Company has lost one of its most colourful figures. Mr. Tweedy has been guiding I.C.I.'s fortunes in Peru since 1933, in which time I.C.I. (Peru)'s turnover has climbed from £69,000 to over £600,000.

It is sometimes surprising how little is known of the distinguished place held by many I.C.I. people in some walk of life they have made their hobby. Mr. Tweedy is a typical instance, for he is a botanist of no mean

PEOPLE

It is announced with regret that **Mr. A. W. Weir**, Personnel Manager of Wilton Works, died on 26th February as a result of a motor accident. He was 52.

A mathematician in the Wilton Work Study Department, **Dr. J. W. Bray,** has been chosen as prospective Labour candidate for the Parliamentary Division of Thirsk and Malton. He is to oppose Mr. R. H. Turton, the present Conservative Member and a former Minister of Health.

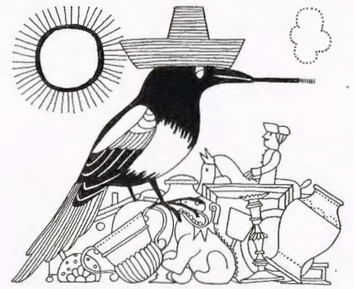
Two Salt Division pensioners recently celebrated their diamond wedding anniversaries within a day of each other. They are **Mr. William Jackson** (42 years' service) and **Mr. Daniel Wood** (55).

Alan Whitehead, an apprentice fitter at Billingham, has been chosen to go with the Schools' Exploring Society on a six weeks' expedition in Arctic Sweden, beginning in August.

Mr. J. S. Shaw, a work study estimator at Plastics Division's Hillhouse Works, has been elected as the next Mayor of Fleetwood. Thirty-eight this month, he will be the town's youngest-ever mayor.

order and some time ago did much behind the scenes to produce a standard book on plant life in the Andes. His interest in botany is by no means purely academic, since he was responsible for both the general design and detailed layout of two golf courses in Lima. He has also designed and personally supervised the planting of the gardens in the New Lima cemetery and the new British Protestant cemetery.

His incursions into real estate in Peru are well known there. More than once he has taken a house, refurnished it inside and out, lost interest when the work was done, and then got rid of it. More recently he built himself a house in the Spanish style constructed



largely of materials of fine workmanship collected from demolished buildings of ancient vintage, and furnished it with antiques from all parts of the world. One visitor from England was so impressed by the diversity of the collection that he exclaimed "But this isn't a house, it's a magpie's nest!" Mr. Tweedy had been looking for a name for his house and seized on this, so that his address is now "Las Urraquerias," which is simply the Spanish version of "Magpie's Nest."

Outnumbered

DO men outnumber women on the I.C.I. staff, or is it the other way round? A very senior official was recently overheard at a Company function to wager half a crown that the men were in the minority.

A search through the I.C.I. Annual Report merely revealed the total number of I.C.I. employees without any of the vital statistics needed to settle the problem. Central Staff Department, however, soon settled the question for us. At 1st January men outnumbered women on the staff by just over two to one (men 25,211, women 11,714).

APPOINTMENTS

Some recent appointments in I.C.I. are: **Alkali Division:** Mr. J. E. A. Stuart, Division Personnel Director. **Billingham Division:** Mr. J. B. Fell, Deputy Chief Accountant. **Central Agricultural Control:** Mr. R. A. Hamilton, chairman (in addition to his duties as Development Director of Billingham Division). **Dyestuffs Division:** Mr. J. L. Porter, Production Director. **General Chemicals Division:** Mr. J. C. Brown, Joint Managing Director; Mr. A. B. Brooks, Engineering Director; Mr. W. F. Jelf, Division Supply Manager; Dr. K. P. Whitehead, Division Medical Officer. **Head Office:** Dr. Lloyd Potter, Principal Medical Officer (from 1st January 1960). **Metals Division:** Mr. J. R. Ibbs, Assistant Production Manager (Rod and Wire) Copper Products Production; Mr. S. G. Temple, Assistant Production Manager (Strip and Sheet) Copper Products Production. **Paints Division:** Mr. G. Costley, Production Director; Mr. J. D. Rose, Joint Managing Director. **Plant Protection Ltd.:** Mr. J. L. Tedbury, a managing director and deputy chairman. **Salt Division:** Mr. J. H. Wolfe, Secretary. **Wilton Works:** Mr. C. T. G. Blackmore, Staff Manager (from 1st October).

RETIREMENTS

Some recent announcements of senior staff retirements are: **Billingham Division:** Mr. A. Nelson, Deputy Chief Accountant, retired 31st March. **Central Agricultural Control:** Mr. S. W. Cheveley, chairman, and Dr. T. Corlett Mitchell, deputy chairman, retired 31st March. **General Chemicals Division:** Mr. A. Jones, Division Supply Manager, retired 28th February. **Head Office:** Dr. A. J. Amor, Principal Medical Officer, retiring 31st December. **Metals Division:** Mr. H. C. Heywood, Division Chief Accountant, retired 30th January. **Paints Division:** Mr. J. C. Lithgow, Production Director, retired 31st March. **Pharmaceuticals Division:** Mr. W. H. Grice, Commercial Director, retired 31st March. **Salt Division:** Mr. H. Joynes, Stafford Works Manager, retiring 30th April.

OBITUARY

Mr. R. Hammond

It is with deep regret that we announce the death on 13th February of Mr. Reg Hammond, *Magazine* correspondent for I.C.I. (Hyde) Ltd. (formerly Leathercloth Division) and a member of the *Magazine* Advisory Panel. He was 54.

Reg Hammond had been with the Company since 1918, when he started work with the British Leather Cloth Manufacturing Co. at Hyde as an office boy. During the second world war he became a foreman in the factory and was chiefly responsible for supervising the production of balloon fabric until called up in 1943. He started in the infantry and was later transferred to the R.A.S.C., where he remained until demobilised in 1946. In 1948 he became Publicity Officer of the Leathercloth Division, which post he retained until increasing ill health forced him to give up last Christmas.

Most of Reg Hammond's spare time was spent on Sunday school and Church work, and only recently he had received an award for twenty-five years' Sunday school teaching. His other hobby was writing poetry, and he had a poem accepted by the Queen Mother on the death of the late King.

As we go to press we learn also of the death of his wife, Ethel, on 25th February. We extend our deep sympathy to their son, David.

BINDING OF 1958 MAGAZINES

The Kynoch Press has again agreed to bind *Magazines* and inserts for those readers who would like this done.

The cost will be 12s. 6d. for a volume of *Magazines* or a volume of inserts, and anyone who wants to take advantage of this offer should advise his *Magazine* correspondent now.

a burden to anybody. Greatest fault: to lack a family, good temper, and good stomach. His greatest and only demand: not to be buried alive. Greatest sin: not to worship Mammon. Important events in his life: none."

During the first twenty years following his discovery of the detonator and of dynamite Alfred Nobel's activities were exclusively limited to the manufacture of nitroglycerin and dynamite, including the rubber dynamite for application in the fields of mining and in road, canal and tunnel constructions. The most remarkable improvements in people's living conditions had thereby been achieved. Nothing could be more misleading than to label Alfred Nobel as a "merchant of death," as has been done. His fortune was collected during these first twenty years. It was not until the middle eighties that his gunpowder manufacture was any part of his business.

Being highly intellectual and strongly influenced by the humanistic tendencies of contemporary literature, with a keen eye for the weaknesses of the political systems of his time, Alfred Nobel could not avoid getting involved in the discussion about war and peace. His discoveries had opened unlimited possibilities for destructive wars, and the great Powers cultivated a hostile attitude towards each other. He said: "If in thirty years we shall not have succeeded in reorganising the world it will inevitably relapse into barbarism." As it actually did.

Nobel himself thought that the only chance of peace lay in the opposing powers hesitating before the risks involved. When Bertha von Suttner, who in 1889 published *Lay Down Arms*, asked for money for the Peace Congress in Berne in 1892, she received a sum, but Nobel did not believe that the congress could be of any particular value. "I believe," he said, "that my factories will put an end to war sooner than your congresses. When the day dawns, when two army corps can destroy each other in one second, all civilised nations will surely recoil from war in horror and disband their armies." At least, he said, the governments would postpone hostile actions for a year or two, hoping that the air would clear in the meantime, some politicians might possibly die, and common people would have time to think it over before starting the bloody business.

When Nobel, in the nineties, felt that it was time to write his will and dispose of a fortune amounting to 33 million Swedish crowns,* he decided that the money should be used for the benefit of society. The witnesses to the will later said that they heard him say on the occasion of signing: "At heart I am a social democrat, in moderation. I especially believe large inherited fortunes to be a misfortune which only serves to stupefy humanity. A person who owns a large fortune should therefore only allow a small part of it to fall to his relatives." He considered it wrong to leave even direct heirs more than they need for education or to let them have a larger sum than they have earned themselves. To act differently, he thought, would mean encouraging indolence and preventing a healthy development of the individual's capacity to create an independent position for himself.

The content of his will is very well known. He stated that:

> With the residue of my convertible estate I hereby direct my Executors to proceed as follows: They shall convert my said residue of property into money, which they shall then invest in safe securities; the capital thus secured shall constitute a fund, the interest accruing from which shall be annually awarded in prizes to those persons who shall have contributed most materially to benefit mankind during the year immediately preceding. The said interest shall be divided into five equal amounts, to be apportioned as follows: One share to the person who shall have made the most important discovery or invention in the domain of Physics; one share to the person who shall have made the most important Chemical discovery or improvement; one share to the person who shall have made the most important discovery in the domain of Physiology or Medicine; one share to the person who shall have produced in the field of Literature the most distinguished work of an idealistic tendency; and, finally, one share to the person who shall have most or best promoted the Fraternity of Nations and the Abolishment or Diminution of Standing Armies and the Formation and Increase of Peace Congresses.

Nobel made up his will and signed it on 27th November 1895. It is known that his distaste for lawyers was so great that even on this exceptional occasion he refused to ask for legal advisers, and consequently many formalities were overlooked.

Nor were the governing bodies who should award the Prizes asked beforehand if they were able or willing to accept the offer. It thus happened that the Swedish Academy of Science, which now awards the Prizes for Physics and Chemistry, felt unable to select representatives even for preliminary discussions with the executors of Alfred Nobel's will until it was evident that the will would become legally recognised. Leading conservative politicians in Sweden declared the will as an infringement of the legal rights of Nobel's heirs.

Meanwhile some of Nobel's heirs in Sweden had brought an action against the executors, claiming that the will should be declared invalid. The executors of the will appointed by Nobel would have met an almost insurmountable resistance from the authorities and the heirs had not the nephew of Alfred Nobel, Ludwig's son Emanuel Nobel, declared in February 1898 that he was willing to do his best to see that his uncle's will should be respected.

The action of Emanuel Nobel on this occasion deserves to be remembered. Such a disregard of what was considered the rights of the heirs as Alfred Nobel had shown was in fact unheard of. Because of the extraordinarily good relations which had always prevailed within the family, Emanuel felt convinced that deeper motives had induced his uncle's decision. He therefore, when the highest representative of the State claimed that Alfred Nobel had been "influenced by peace fanatics and particularly by women" and advised him to act in favour of the heirs' rights, responded: "Your Majesty, it is not my intention to take any action through which members of my family in the future could be blamed by the most highly deserving scientists of the time for having deprived them of something which duly ought to be theirs."

Emanuel Nobel called the executors "solicitors of the soul." He participated in the preliminary discussions between them and the representatives of the Swedish Academy and the Karolinska Institute. A proposal was made on 5th June 1898 according to which the heirs should be allotted one and a half years' income to the estate, provided they recognised the will and waived any further claims on the estate. To this they agreed, and thereby the estate was saved for the Nobel Foundation, whose Articles were approved by the King of Sweden in June 1900. The following year, 1901, the first Nobel Prizes were awarded.

* About £2m., equivalent to almost £8m. at present-day values.

Handicap Twenty-four

By Hugh Dunt

When I play golf I say my game is really cricket. If I slice a golf ball in the direction of cover point I'm pleased at having hit the thing at all. Consequently, fear not, golf is only an incidental theme to this article.

I was introduced to the game in Kenya. Before leaving England I had learned that my future General Manager, who has long since retired, looked on golf with an affection which left only one course open to me.

Geoffrey Sharp (son of the famous Jack, of England soccer and cricket fame) took me into his sports shop in Liverpool. I walked out the proud possessor of an oblong bag, liberally decorated with gleaming 'Lightning' fasteners. Inside clanked tunefully several irons and woods, as Geoffrey called them. I had also bought a ball, which I felt might come in useful.

There was no time to experiment with my new toy until outward bound for East Africa. I practised putting in my cabin and slashed paper balls into the blue Mediterranean. I felt pleased with my progress until someone suggested I would do better if I removed the little leather cover at the end of my driver.

The next opportunity for me to swing a club came the day I arrived at Lake Magadi.

"Play golf?"

"Yes, sir."

"Good! Five o'clock this evening, then." These words dismissed me from my first interview with the General Manager.

Mark Twain I think it was who wrote: "Work consists of whatever a body is obliged to do, and play consists of whatever a body is not obliged to do." A fair enough definition. I should therefore have been entitled to time and a half for my first game of golf.

It took half a dozen attempts before I was able to balance the ball on the little paper tee. This was something I had not read in "the book." The General Manager and our opponents stood quietly by—I realise now, in respectful silence. Unfortunately, when I had at last got the ball nicely balanced it took me three swipes before I could knock it off. Even more unfortunately, I had to play my fourth shot from behind a small box containing sand. Only the most tolerant attitude to the young and impetuous saved me from being shipped back to England on the next boat. But the chivalrous nature of Jack, as I was later privileged to call him, went beyond mere tolerance. It was he who provided me with the excuse I use to this day. It is a nine-hole course at Magadi. Over a beer at the tenth he patted my shoulder. "All you want is practice, me lad. Anyone can see cricket is your game." A kindly remark—and little deserved.

Browns take the place of greens on many of the links in East Africa. The language and the rules of golf, with slight variations, are similar the world over. Local conditions sometimes call for local adjustments. The Magadi Committee have made slight amendments to one, and to the other none at all. Perhaps in an effort to ease the strain on your vocabulary they allow you to pick out a rhino footprint without penalty. This story has been handed down from generation to generation. I have never seen a rhino on the links, but I have been shown the footprints. I did not say so at the time, but I thought they looked uncommonly like those of the Production Manager—a particular friend of mine, who, should he read these words, will demand a large drink as repayment for a grave injustice.

There are no half-measures about anything at Lake

Magadi. The rough is no exception. I put my clubs down once while I was looking for a ball. I never did it again. The more sensible take precautions. Last time I played there my host produced a tee festooned with half a dozen gaily coloured woollen balls. "Peter," I asked, "whatever's that?"

I received a pitying look. "I may lose ma ball," he replied; "but I'll no lose ma tee."

Magadi golf links have given me many happy hours. I believe it owes its existence to Charles Shotton, who, in the first days, had to present a set of clubs to a member of the staff to make up a twosome.

No one who knew Charles could play at Magadi without remembering his mastery of what I choose to call *his* piece of Kenya. He knew every blade of grass, every volcanic rock, every mood of the winds—and, no doubt, every rhino footprint. He once played a handicap-two visitor, using only his putter. That skill helped him to win, I am sure. I am equally certain that his friends—the stones, the clumps of scrub, and the iron-hard bunkers—all rallied to his aid. They must have known him as he knew them. For twenty-seven years they had said "good evening" to each other every Wednesday and Saturday.

Nor could Charles' contemporaries forget his help and guidance to the "rabbits"; his unerring sense of knowing exactly where lost balls were hiding; his ability to make golf fun; and the certainty that a shilling won from him at golf would soon find its way back into his pocket after the inevitable visit to the club's snooker table. But that would be his "golf shilling," others went freely to quench the thirst of his opponents. It was as difficult to beat his hand to the bar chit as it was to lower his colours on the field (or table) of action.

Charles too is retired. He succeeded Jack as General Manager. Now they are neighbours, and a South of England golf club benefits by our loss.

Other links have suffered from my scythe-like approach to golf. My "home ground" is in Mombasa. Here the bogeys for some holes alter with the change of the monsoon. A tap, with the trade wind behind you, can take you far down the fairway. When it changes, even a full-blooded drive is liable to falter in mid-air and plop down almost at your feet. Small wonder the Arab dhows make sure the monsoon has definitely set from the south before they unfurl their sails and glide back to Aden and the Persian Gulf. At this time, usually towards the end of April, our longer holes become fives when driving south and fours when driving north. They reverse these targets—always unobtainable to me—when the dhows return around October, laden with salt and carpets and piloted by seamen from a past age.

Mombasa's golf links can safely be classed as interesting and beautiful. One hole aptly fits both descriptions. It has the sea between tee and brown. *The* golfers drive over the sea. The meek and mild treat it as a dogleg. One member, it is told, unsure in which category he belonged, drove four balls straight into the Indian Ocean. Then, as if realising his limitations, he picked up his golf bag and threw that in too. Later, after his pint in the club house, he was seen to retrace his steps to the scene of the tragedy. "Fortunately," someone had remarked, "the tide is low. Old George has had second thoughts."

They watched him walk over, take his shoes and socks off, and wade in. Out he came with his bag, unzipped the pocket, took out his car keys—and then threw the bag back in the sea.

The Shell Company move their good men round. Their policy lost me a regular partner at Mombasa. One day we returned to the club after a game in which the sea had claimed the penalty of Alan's pull shot and dogged determination. News had travelled in

"Old boy," he said, turning to me, "there is only one answer. We must drink more!"

advance. With one voice our ladies left us in no doubt that we had better give up golf and take to marbles. "It's silly," Joyce insisted. "Your golf ball bill is bigger than your bar account!"

Although this remark was directed at her husband, I must admit it scored with me. One peep out of me, and Margaret, I could tell, was ready to give full support to her own sex. I was worried. But Alan was made of sterner stuff. A man of action, he changed apparent defeat into victory. "Old boy," he said, turning to me, "there is only one answer. We must drink more!"

Since that day I have lost many balls, or at any rate sufficient per game to justify a pot of ale at the tenth or, when I am energetic enough, at the nineteenth. The more I play the more I enjoy the game. That I never improve has compensations, for which I must thank Alan. I must also be grateful that the story of George never reached Magadi. Otherwise my first partner, with much justification, might well have thrown me and my golf bag into the Lake.

A short while ago I returned to my old love for one afternoon. It was the Fathers' cricket match against my younger boy's school. Things did not go too well for the Dads. Fortunately, I was ready with my excuse. "My game is really golf."

"Pearly King"

Photo by F. B. Harrop (Engineering Services, Gillingham Street)